A C O U S T I C S A N D A I R

200 ALDINGTON ROAD, KEMPS CREEK - WAREHOUSE DEVELOPMENT

AIR QUALITY IMPACT ASSESSMENT

REPORT NO. 20254
VERSION B

OCTOBER 2020

PREPARED FOR

ETHOS URBAN
173 SUSSEX STREET
SYDNEY NSW 2000

WILKINSON MURRAY

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	23 September 2020	Sam Demasi	John Wassermann
B	Final	7 October 2020	Sam Demasi	-

Note
All materials specified by Wilkinson Murray Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose. The information contained in this document produced by Wilkinson Murray is solely for the use of the client identified on the front page of this report. Our client becomes the owner of this document upon full payment of our **Tax Invoice** for its provision. This document must not be used for any purposes other than those of the document's owner. Wilkinson Murray undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.

Quality Assurance
Wilkinson Murray operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued.

Certified System
Quality
ISO 9001
SAI GLOBAL

CASANZ
This firm is a member firm of the Clean Air Society of Australia and New Zealand and the work here reported has been carried out in accordance with the terms of that membership.

Celebrating 50 Years in 2012
Wilkinson Murray is an independent firm established in 1962, originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. Today, with offices in Sydney, Newcastle, Wollongong, Queensland and Hong Kong, Wilkinson Murray services the entire Asia-Pacific region.

50 YEARS 1962–2012

TABLE OF CONTENTS

GLOSSARY OF AIR QUALITY TERMS

Air Pollution – The presence of contaminants or pollutant substances in the air that interfere with human health or welfare or produce other harmful environmental effects.

Air Quality Standards – The level of pollutants prescribed by regulations that are not to be exceeded during a given time in a defined area.

Air Toxics – Any air pollutant for which a national ambient air quality standard (NAAQS) does not exist (i.e. excluding ozone, carbon monoxide, PM-10, sulphur dioxide, nitrogen oxide) that may reasonably be anticipated to cause cancer; respiratory, cardiovascular, or developmental effects; reproductive dysfunctions, neurological disorders, heritable gene mutations, or other serious or irreversible chronic or acute health effects in humans.

Airborne Particulates – Total suspended particulate matter found in the atmosphere as solid particles or liquid droplets. Chemical composition of particulates varies widely, depending on location and time of year. Sources of airborne particulates include dust, emissions from industrial processes, combustion products from the burning of wood and coal, combustion products associated with motor vehicle or non-road engine exhausts, and reactions to gases in the atmosphere.

Area Source – Any source of air pollution that is released over a relatively small area, but which cannot be classified as a point source. Such sources may include vehicles and other small engines, small businesses and household activities, or biogenic sources, such as a forest that releases hydrocarbons, may be referred to as nonpoint source.

Concentration – The relative amount of a substance mixed with another substance. Examples are 5 ppm of carbon monoxide in air and 1 mg/l of iron in water.

Emission – Release of pollutants into the air from a source. We say sources emit pollutants.

Emission Factor – The relationship between the amount of pollution produced and the amount of raw material processed. For example, an emission factor for a blast furnace making iron would be the number of pounds of particulates per ton of raw materials.

Emission Inventory – A listing, by source, of the amount of air pollutants discharged into the atmosphere of a community; used to establish emission standards.

Flow Rate – The rate, expressed in gallons -or litres-per-hour, at which a fluid escapes from a hole or fissure in a tank. Such measurements are also made of liquid waste, effluent, and surface water movement.

Fugitive Emissions – Emissions not caught by a capture system.

Hydrocarbons (HC) – Chemical compounds that consist entirely of carbon and hydrogen.

Hydrogen Sulphide (H_2S) – Gas emitted during organic decomposition. Also, a by-product of oil refining and burning. Smells like rotten eggs and, in heavy concentration, can kill or cause illness.

Inhalable Particles – All dust capable of entering the human respiratory tract.

Nitric Oxide (NO) – A gas formed by combustion under high temperature and high pressure in an internal combustion engine. NO is converted by sunlight and photochemical processes in ambient air to nitrogen oxide. NO is a precursor of ground-level ozone pollution, or smog.

Nitrogen Dioxide (NO_2) – The result of nitric oxide combining with oxygen in the atmosphere; major component of photochemical smog.

Nitrogen Oxides (NO_x) – A criteria air polluant. Nitrogen oxides are produced from burning fuels, including gasoline and coal. Nitrogen oxides are smog formers, which react with volatile organic compounds to form smog. Nitrogen oxides are also major components of acid rain.

Mobile Sources – Moving objects that release pollution; mobile sources include cars, trucks, buses, planes, trains, motorcycles and gasoline-powered lawn mowers.

Particulates; Particulate Matter (PM_{10}) – A criteria air pollutant. Particulate matter includes dust, soot and other tiny bits of solid materials that are released into and move around in the air. Particulates are produced by many sources, including burning of diesel fuels by trucks and buses, incineration of garbage, mixing and application of fertilizers and pesticides, road construction, industrial processes such as steel making, mining operations, agricultural burning (field and slash burning), and operation of fireplaces and woodstoves. Particulate pollution can cause eye, nose and throat irritation and other health problems.

Parts Per Billion (ppb)/Parts Per Million (ppm) – Units commonly used to express contamination ratios, as in establishing the maximum permissible amount of a contaminant in water, land, or air.

PM_{10}/$PM_{2.5}$ – PM_{10} is measure of particles in the atmosphere with a diameter of less than 10 or equal to a nominal 10 micrometers. $PM_{2.5}$ is a measure of smaller particles in the air.

Point Source – A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack.

Scrubber – An air pollution device that uses a spray of water or reactant or a dry process to trap pollutants in emissions.

Source – Any place or object from which pollutants are released.

Stack – A chimney, smokestack, or vertical pipe that discharges used air.

Stationary Source – A place or object from which pollutants are released and which does not move around. Stationary sources include power plants, gas stations, incinerators, houses etc.

Temperature Inversion – One of the weather conditions that are often associated with serious smog episodes in some portions of the country. In a temperature inversion, air does not rise because it is trapped near the ground by a layer of warmer air above it. Pollutants, especially smog and smog-forming chemicals, including volatile organic compounds, are trapped close to the ground. As people continue driving and sources other than motor vehicles continue to release smog-forming pollutants into the air, the smog level keeps getting worse.

1 INTRODUCTION

Fife Capital and Stockland have entered into a joint venture to rezone and develop 106 to 228 Aldington Road, Kemps Creek as an industrial estate. The Site is known as 200 Aldington Road and is located within Penrith City Local Government Area.

Wilkinson Murray Pty Limited (WM) has been commissioned by Ethos Urban on behalf of the joint venture to undertake an air quality assessment to accompany a state significant development application (SSDA) for 200 Aldington Road.

SSDA 10479 is seeking consent for the Concept Plan as well as the construction and operation of Stage 1. Additional stages will follow soon after. The Department of Planning, Industry and Environment (DPIE) issued the Secretary's Environmental Assessment Requirements (SEARs) in July 2020.

The relevant section of the SEARs is reproduced below:

> *"**Air Quality** – including an assessment of air quality impact at sensitive receivers during construction and operation in accordance with NSW Environment Protection Authority guidelines and details of mitigation, management and monitoring measures"*

This assessment forms part of an Environmental Impact Assessment (EIS) for the project.

Mr Sam Demasi is suitability qualified to prepare such assessments. He is employed as an Associate of Wilkinson Murray and has been involved in many construction projects and prepared many similar assessments.

A review of this report shall be undertaken by Mr John Wassermann, a Director of Wilkinson Murray with over 30 years' experience in the field of acoustics and air quality. He is a member of the Engineers Australia and of Clean Air Society of Australia & New Zealand (CASANZ).

Wilkinson Murray is a member firm of CASANZ.

2 OVERVIEW OF THE PROJECT

2.1 Proposal

The proposal seeks consent for the Concept Plan and Stage 1 development as per below:

- A concept masterplan with an indicative total building area of 375,755 sqm, comprising:
  - 357,355 sqm of warehouse gross floor area (GFA);
  - 18,200 sqm of ancillary office GFA;
  - 200 sqm café GFA;
  - 13 individual development lots for warehouse buildings with associated hardstand areas;
  - Internal road layouts and road connections to Aldington Road;
  - Provision for 1,700 car parking spaces; and
  - Associated site landscaping.
- Detailed consent for progressive delivery of site preparation, earthworks and infrastructure works (i.e. Stage 1 works) on the site, including:
  - Demolition and clearing of all existing built form structures;
  - Drainage and infill of existing farm dams and any ground dewatering;
  - Clearing of all existing vegetation;
  - Construction of a warehouse building with a total of 50,930 sqm of GFA, including:
    - 48,430 sqm of warehouse GFA;
    - 2,500 sqm of ancillary office GFA;
    - 231 car parking spaces; and
    - associated landscaping
- Bulk earthworks including 'cut and fill' to create flat development platforms for the warehouse buildings, and topsoiling and grassing / site stabilisation works;
- Roadworks, access infrastructure and associated landscaping;
- Stormwater and drainage works including stormwater basins, diversion of stormwater lines, gross pollutant traps and associated swale works;
- Sewer and potable water reticulation; and
- Inter-allotment, road and boundary retaining walls.

The current masterplan is show in **Figure 2-1**.

For the purpose of assessing impacts associated with construction and operation of this facility, this assessment considers worst case scenarios.

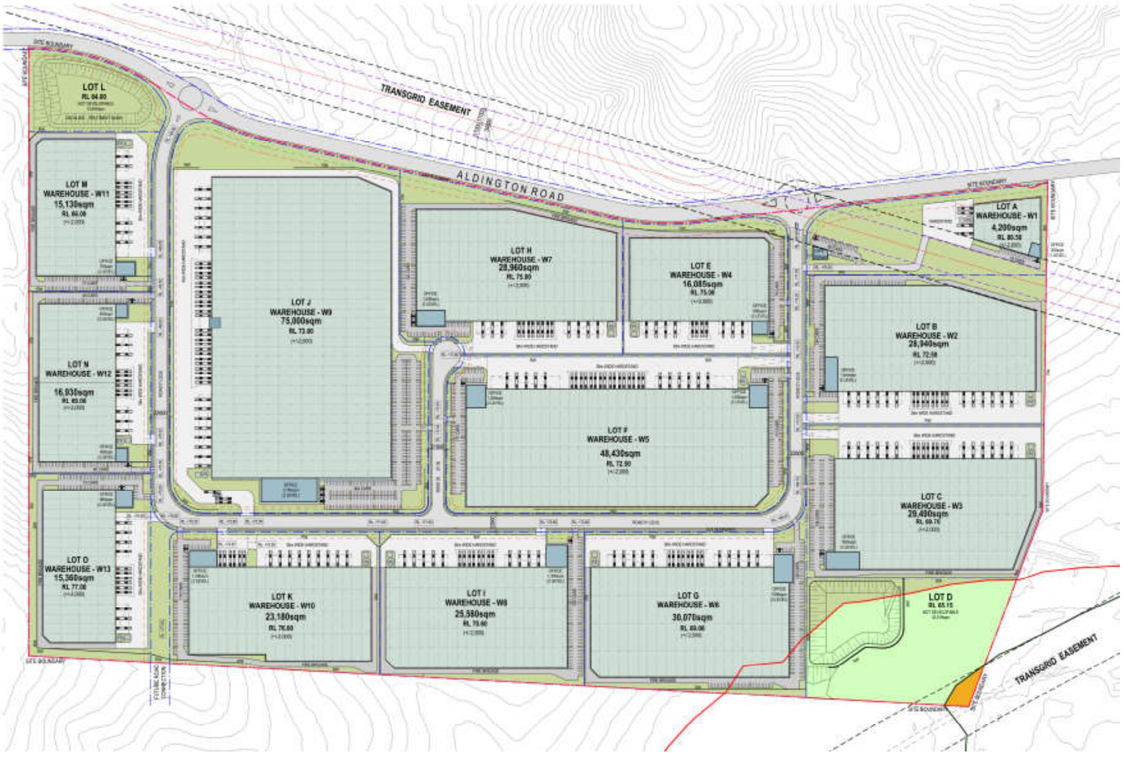
On this basis, it is assumed that all demolition and earthworks for the site will be undertaken as well as the construction of a single warehouse building (Warehouse W5). Furthermore, it is assumed that the warehouse is operating at capacity.

In terms of construction activities and in line with EPA guidelines, it is expected that Standard Construction Hours will be conditioned as follows:

- Monday to Friday 7:00am to 6:00pm;
- Saturday 8:00am to 1:00pm; and
- No work on Sunday and Public Holidays.

The Site is seeking to have the flexibility for each warehouse to operate 24 hours a day, every day of the week.

Figure 2-1 Masterplan of the Site



Source: SBA Architects, Drawing No. MP04, Revision F, dated 01/10/2020.

2.2 Location of Site & Surrounds

The Site is located in the suburb of Kemps Creek, within the Penrith City Local Government Area. Furthermore, it is within the Mamre Road Precinct forming part of the Western Sydney Employment Area. The Precinct covers an area of approximately 972 hectares and was rezoned in June 2020 to mostly *IN1 General Industrial*. Environmentally sensitive areas are zoned *E2 Environmental Conservation* with adjoining recreation areas zone accordingly.

Currently, the Site includes scattered residential dwellings (within a rural setting), vacant land and agricultural green houses. There are seven parcels of land that make up the Site within 106 to 228 Aldington Road, Kemps Creek covering an area of approximately 72 hectares. In terms of zoning, it is mostly *IN1 General Industrial* with the north-eastern corner of the Site zoned *E2 Environmental Conservation* and a larger section of the north-eastern corner, adjoining *E2*, zoned *RE2 Private Recreation*.

Mamre Road is a major arterial road that is located to the west of the Site and this road is planned to be upgraded in the near future. Investigations for the concept design for Stage 1 (M4 to Erskine Park Road) started in early 2020. Stage 2 will deliver the upgrade in the vicinity of the Site (Erskine Park Road to Kerrs Road); however, a definitive timeline is not known at this stage.

There are also several infrastructure projects currently being investigated including the Southern Link Road (M12 Motorway) to the north of the Site and the proposed Western Sydney Freight Line and potential Intermodal Terminal located to the west and north-west of the Site along Mamre Road.

Of the many current projects being constructed in the area, the Western Sydney Aerotropolis will result in increased road movements and introduce aircraft movements in the area. This in turn will impact the airshed in this region.

Immediately surrounding the Site to the north, south and west (across Aldington Road) are rural lands, some with residential dwellings; however, the area has been earmarked for industrial development. Immediately to the east is vacant rural land and further east the suburb of Mt Vernon is located. This suburb includes residences on large parcels of land and is zoned *RU4 Primary Production*.

Further north Oakdale West Industrial Estate (currently under construction) is located and to the north-east Oakdale South Industrial Estate (recently completed). Both of these estates are owned and managed by Goodman.

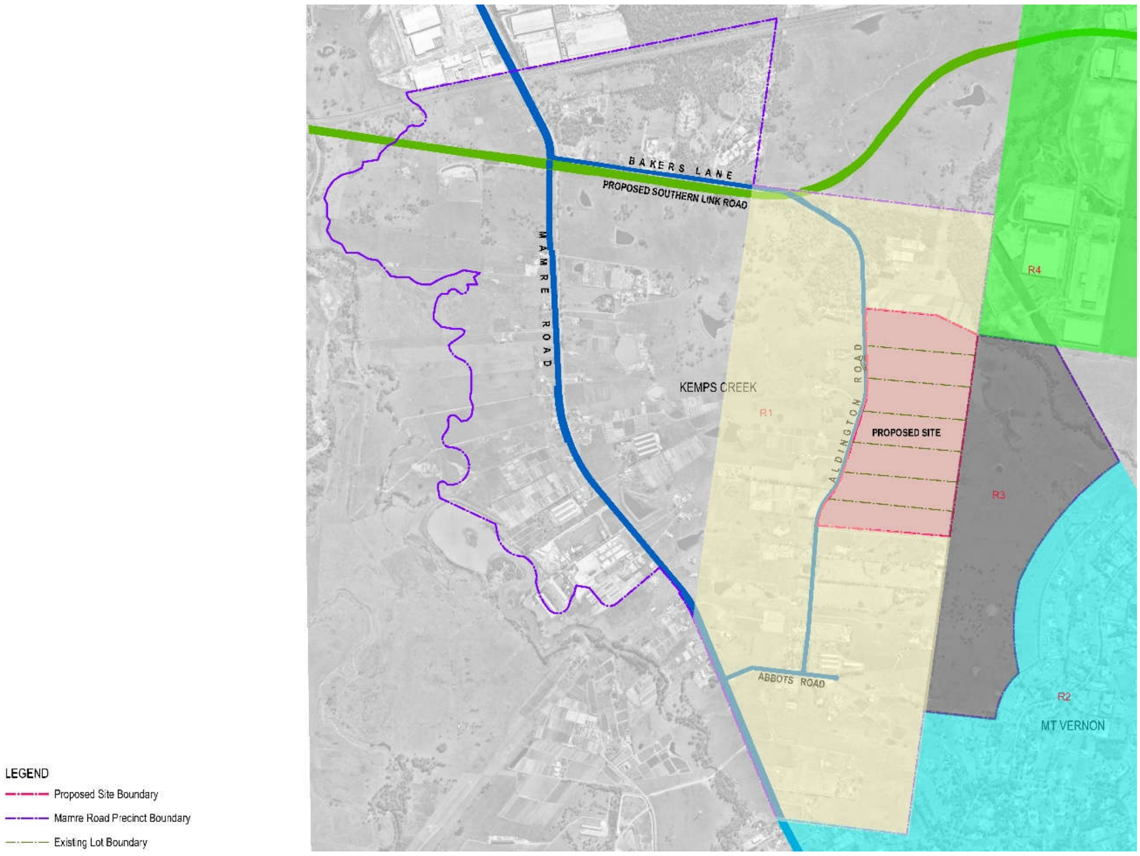
It is important to note that with reference to the State Environmental Planning Policy (Western Sydney Employment Area) – Mamre Road Precinct – Land Zoning Map, that the immediate area surrounding the site is identified as *IN1 General Industrial* with the exception of the north-eastern corner of the Site as previously mentioned. Notwithstanding this, from an air quality aspect, the most impacted receivers are the surrounding rural residences, further afield industrial estates are either completed or currently being developed.

Table 2-1 provides a summary of immediate surrounding sensitive receivers and **Figure 2-2** shows theses receivers on an aerial as well as the Site boundary (including lot boundaries), the Mamre Road Precinct boundary and the approximate location of the proposed Southern Link Road.

Table 2-1 Surrounding Sensitive Receivers

Receiver ID	Receiver Type
R1	Residential within IN1
R2	Residential within RU4
R3	Vacant within IN1
R4	Industrial within IN1

Figure 2-2 Location of Site and Surrounding Receivers



Source: SBA Architects, Drawing No. MP02, Revision D, dated 01/10/2020 – as modified by WM.

2.3 Potential Sources of Air Emissions Associated with the Development

Air emissions are likely during both the construction and the operation of the warehouse development (Warehouse W5). The most likely sources are summarised in the following sections.

2.3.1 Sources during Construction

At the time of preparing this assessment a detailed construction programme was not developed, however the following stages and typical activities can be expected from this project:

Demolition:

- Likely to the shortest and of least impact.
- Small number of structures to be removed using trucks, excavators and hand tools.

Earthworks:

- Likely to the longest stage of works and of most impact.
- Significant earthworks required that will involve a large number of trucks, excavators, dozers, graders and associate equipment.

Construction of Warehouses:

- Given the staging it is likely to be of a short duration with less impact than earthworks.
- Building works likely to involve a high number of truck movements, cranes and power tools.

During the temporary phase of construction earthwork activities including moving of material and truck movements along haul roads (wheel generated dust) is likely to lead to short-term elevate levels of:

- Particulate Matter (Total Suspended Particulates (TSP), PM_{10} and $PM_{2.5}$)).
- Deposited Dust.

2.3.2 Sources during Operation

At the time of preparing this assessment the end users were not known, however based on typical warehouse usage, the following activities can be expected from this project.

- Off-site and on-site vehicular movements including trucks idling.
- Forklift movements.

These operations will result in wheel-generated dust from vehicles travelling (on sealed roads) within the complex and on the local road network as well as from vehicle exhaust and may result in the elevation of:

- Particulate Matter (PM_{10} and $PM_{2.5}$).
- Oxides of Nitrogen (NO_x) and in particular as Nitrogen Dioxide (NO_2).

3 AIR QUALITY CRITERIA

3.1 Introduction

The Environmental Protection Authority (EPA) developed a guideline in 2017 entitled "*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*" (Approved Methods) that sets out applicable impact assessment criteria for several air pollutants.

3.2 Impact Assessment Criteria

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality. The sections below identify the pollutants of interest for this assessment and the applicable air quality criteria for each pollutant.

The criteria presented in the Approved Methods are consistent with the National Environment Protection Council's (NEPC), *National Environment Protection (Ambient Air Quality) Measure, 2016* (NEPM). It is noted that there are no criteria specified for deposited dust within the NEPM.

Table 3-1 summarises the criteria for pollutants that are relevant to this study. The air quality impact assessment criteria relate to the total concentrations in the air and not just that from the project. Therefore, some consideration of background levels needs to be made when using these goals to assess impacts.

Table 3-1 Impact Assessment Criteria

Pollutant	Averaging period	Impact	Criteria
Nitrogen dioxide (NO_2)	Annual	Total	62 µg/m³
	1-hour	Total	246 µg/m³
Total suspended particulates (TSP)	Annual	Total	90 µg/m³
Particulate matter ≤10 µm (PM_{10})	Annual	Total	25 µg/m³
	24-hour	Total	50 µg/m³
Particulate matter ≤2.5 µm ($PM_{2.5}$)	Annual	Total	8 µg/m³
	24-hour	Total	25 µg/m³
Deposited dust (DD)	Annual	Total	4 g/m²/month
	Annual	Incremental	2 g/m²/month

4 EXISTING ENVIRONMENT

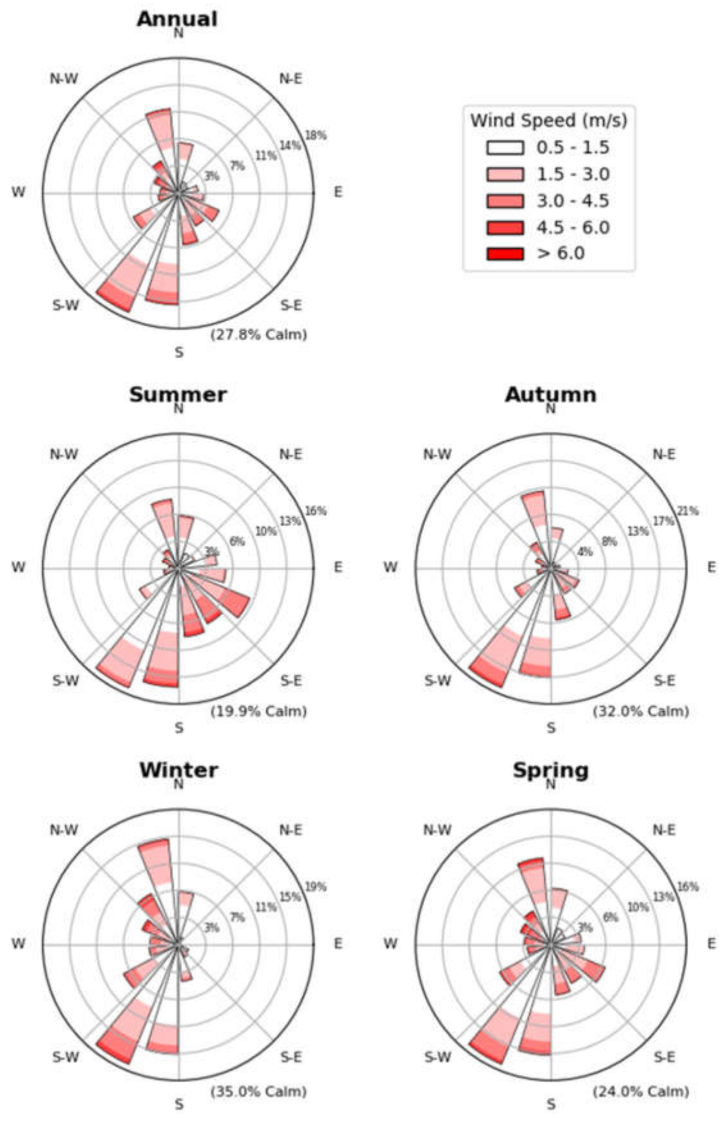
4.1 Local Climate

Meteorological conditions strongly influence air quality. Most significantly, with respect to dust and particulate matter, wind speed and wind direction affect the dispersion of air pollutants.

Observations of wind speed and direction from the Office of Environment and Heritage (OEH) air quality monitoring station (AQMS) at St Marys have been selected to represent typical wind patterns in the area surrounding the site. The St Marys AQMS is located approximately 6.2 kilometres north north-west from the centre of the site. The AQMS is located on a residential property approximately 160m from Mamre Road.

Figure 4-1 presents annual and seasonal "wind rose" plots for the St Marys AQMS, averaged for the period 2015 to 2019, inclusive. As can be seen from the plots, winds from within the south to south-west and north-west to north octants are most common in all four seasons.

Figure 4-1 Windrose Plot – St Marys OEH AQMS, 2015-2019



4.2 Ambient Air Quality Data

Data from the St Marys AQMS has been used to establish typical ground level concentrations of the main airborne pollutants of interest. A summary of these pollutants over the five year period 2015 – 2019 is presented in **Table 4-1** together with the average over 5 years and impact criteria.

Table 4-1 Air Quality Monitoring Results from St Marys – Annual Averages

Year	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	NO_2 (µg/m³)
2015	15.0	Note 1	8.3
2016	16.1	Note 2	7.5
2017	16.2	7.0	8.7
2018	Note 2	7.8	10.3
2019	24.6	9.9	7.6
5-year Average	18.0	8.2	8.5
Impact Criteria	25	8	62

Note 1: Observations of $PM_{2.5}$ at the St Marys AQMS began in 2016.
Note 2: Less than 75% valid data collected.

It should be noted that elevated particulate levels were measured in 2019 compared to the previous years. The elevated levels on the whole were due significant bushfires and dust storms in NSW from October to December. A review of the data from St Marys and comparison to the impact criteria indicates the following:

PM_{10}

- Measured annual average has been steady between 15.0 and 16.2 µg/m³ with the exception of a sharp rise to 24.6 µg/m³ for the 2019 year. The annual 2019 report is yet to be issued and so we have not been able to confirm events that lead to such differences. However, it is likely that the impact of the bushfires and local dust storms contributed to this sharp rise.
- Considering this data period, the annual impact criteria of 25 µg/m³ has not been exceeded and the arithmetic average of the period is calculated to be 18.0 µg/m³ which is at 72% of the annual impact criteria.

$PM_{2.5}$

- Measured annual average has ranged between 7.0 and 9.9 µg/m³. The higher 2019 level is likely due to bushfires and local dust storms.
- Considering this data period, the annual impact criteria of 8 µg/m³ was exceeded for the 2019 year. The arithmetic average of the period is calculated to be 8.2 µg/m³ which is slightly above (103%) the criteria.

NO_2

- Measured annual average has been quite steady between 7.5 and 8.7 µg/m³ with a slight increase in 2018 to 10.3 µg/m³.
- Considering this data period, the annual impact criteria of 62 µg/m³ is easily achieved and the arithmetic average of the period is calculated to be 8.5 µg/m³ which is at 14% of the

annual impact criteria.

4.3 Emissions within Kemps Creek Airshed

The NSW Environment Protection Authority (EPA) has produced an air emissions inventory for both human-made and natural sources in NSW. The inventory extends to the greater metropolitan region (GMR) which is further categorised into three urban regions (Sydney, Newcastle and Wollongong).

Kemps Creek is within the Sydney region and the general airshed around Kemps Creek is currently controlled by human-made sources including road traffic noise from the many arterial roads, general industry (mostly warehouse distribution) as well as a small number of quarry and manufacturing sites. Wood burning and earthworks/construction are also contributors (particle pollution) to the general airshed.

The most current inventory report is for the 2013 calendar year, the previous report covered 2008. For this project, the following information from these reports has been summarised for the Sydney region and can be used to approximate the proportion within Kemp Creek.

Table 4-2 Proportion of Total Estimated Annual Emissions (%)

Year	PM_{10}		$PM_{2.5}$		NO_x Note 1	
	Natural	Human	Natural	Human	Natural	Human
2008	19.1	80.9	8.1	91.9	1.7	98.3
2013	27.3	72.7	27.7	72.3	4.3	95.7

Note 1: It has been conservatively assumed that 100% of the NO_X emissions are NO_2.

For the three pollutants, **Table 4-2** shows a reduction in the proportion of human-made emissions between the 2008 calendar year and 2013 calendar year.

The inventory further provides the proportion of total emissions by human-made source type (refer **Figure 4-2** for 2013 data). Considering this data and the proportions within **Table 4-2**, **Table 4-3** summarises the contribution from road traffic.

Table 4-3 Proportion of Total Estimated Annual Emissions – Road Traffic (%)

Year	PM_{10}	$PM_{2.5}$	NO_x[1]
2008	10.4	13.2	60.7
2013	8.7	9.3	53.0

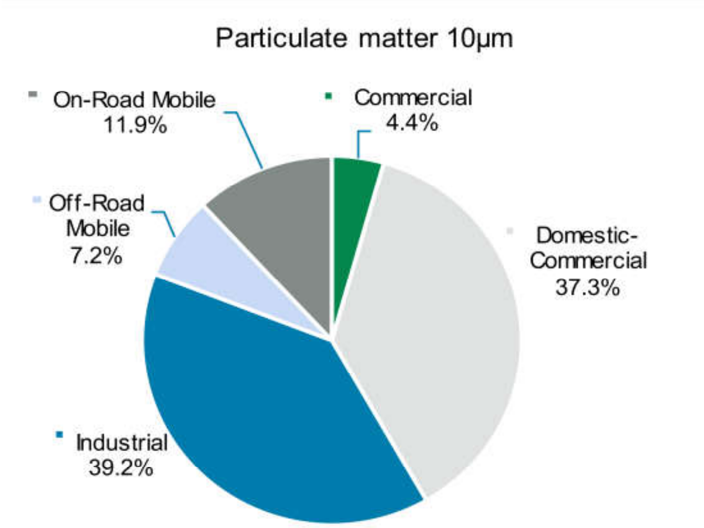
Note 1: It has been conservatively assumed that 100% of the NO_X emissions are NO_2.

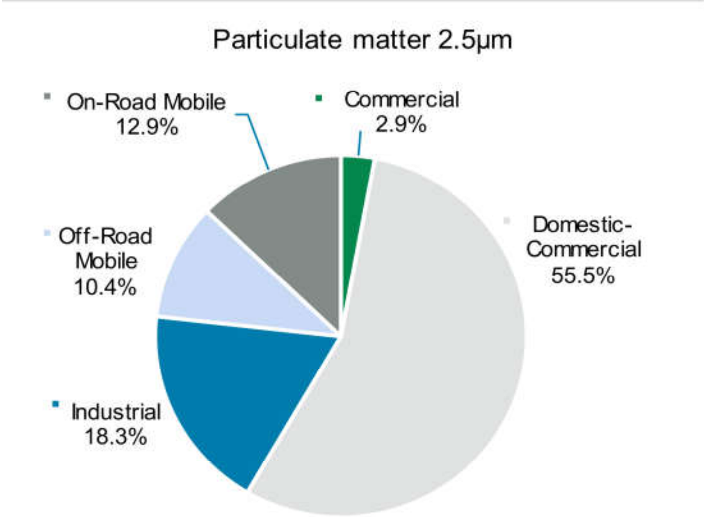
The table shows a reduction in the proportion of emissions from road traffic between the 2008 calendar year and 2013 calendar year despite an increase in traffic.

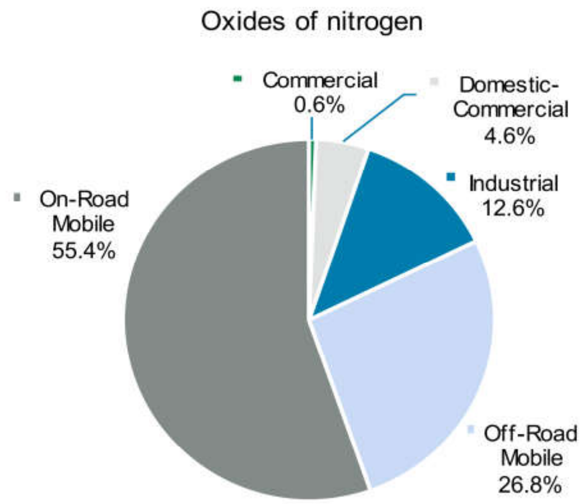
It is critical to note that since 2013 there have been many additional measures to improve exhaust emissions from road traffic including emission controls for new vehicles (Euro 5 standards to all light vehicles manufactured from November 2016) and improvements in fuel quality standards (February 2019). Furthermore, Australia is currently reviewing vehicle emission controls further, considering Euro 6 for light vehicles and Euro VI for heavy vehicles.

On this basis, it is considered conservative to assume the road traffic emissions for 2013 as per **Table 4-3** apply to the current environment.

Figure 4-2 Proportions of Total Estimated Annual Emissions for Human-made Source Types (PM_{10}, $PM_{2.5}$ and NO_x) - Sydney Region - 2013






Oxides of nitrogen
Commercial 0.6%
Domestic-Commercial 4.6%
Industrial 12.6%
Off-Road Mobile 26.8%
On-Road Mobile 55.4%

5 ASSESSMENT OF AIR QUALITY DURING CONSTRUCTION WORKS

5.1 Assessment Methodology

The EPA does not at this stage have specific guidelines to consider dust from construction sites in terms of a risk assessment and management approach. It has developed a guideline entitled '*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*" (2017), however, this guideline considers detailed modelling approaches and is not specifically relevant to construction dust impacts. A detailed modelling approach is not necessary for short term construction impacts that can be managed.

A risk-based approach has however been developed in the United Kingdom by the Institute of Air Quality Management (IAQM). The guideline is entitled "*IAQM Guidance on the Assessment of Dust from Demolition and Construction*" (IAQM, 2014).

This approach has been widely used for performing qualitative assessments of dust emissions from construction sites and has been used in NSW by Wilkinson Murray and other consultants.

Furthermore, it has been accepted as a suitable approach in the absence of any guidance by Australian regulatory authorities.

This section presents a qualitative assessment of potential air quality impacts associated with the proposed works and has been conducted in general accordance with the methodology described in the previously IAQM Guideline.

This approach presents the risk of dust soiling and human health impacts associated with four types of activities that occur on construction sites (demolition, earthworks, construction and trackout) and involves the following steps:

- Step 1: Screen the need for a detailed assessment;
- Step 2: Assess the risk of dust impacts arising, based on:
    - The potential magnitude of dust emissions from the works; and
    - The sensitivity of the surrounding area.
- Step 3: Identify site-specific mitigation; and
- Step 4: Consider the significance of residual impacts, after the implementation of mitigation measures.

For this project, the process outlined above will be applied to the worst-case on-site and off-site activities that will result in the likely highest generation of dust. This approach will result in a conservative assessment of the potential risks for human health and dust soiling impacts.

For this project, the earthworks phase (and associated trackout) is considered the greatest potential to generate short-term high levels of dust. On this basis, this report has focused on the assessment of this worst-case scenario.

5.2 Risk Assessment of Dust Impacts from Proposed Construction Works

The following qualitative risk assessment of potential dust impacts has been conducted for the proposed construction works.

5.2.1 Step 1 – Screen the need for a detailed assessment

The IAQM guidance recommends that a risk assessment of potential dust impacts from construction activities be undertaken when human receptors are located within:

- 350m of the boundary of the site; or,
- 50m of the route(s) used by construction vehicles on public roads up to 500m from the site entrance(s).

As can be seen in **Figure 2-2**, the nearest receivers to the north, south and west are located within 350m of the proposed site and therefore, an assessment of dust impacts is considered necessary under the guideline.

5.2.2 Step 2A – Potential Dust Emission Magnitude

In accordance with the IAQM guidance (Section 7, Step 2: Assess the Risk of Dust Impacts), dust emission magnitudes from earthworks may be defined as:

- **Large:** total site area >10,000 sqm, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes;
- **Medium:** total site area 2,500 sqm – 10,000 sqm, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 tonnes – 100,000 tonnes; and,
- **Small:** total site area <2,500 sqm, soil type with large grain (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <20,000 tonnes.

The areas affected by the proposed earthworks are in excess of 10,000 sqm and the material to be removed would exceed 100,000 tonnes.

Regarding dust "trackout" associated with haulage activities, dust emission magnitudes may be defined as:

- **Large:** >50 heavy vehicle outward movements per day, potentially dusty surface material, unpaved road length >100m;
- **Medium:** 10 – 50 heavy vehicle outward movements per day, moderately dusty surface material, unpaved road length 50m – 100m; and,
- **Small:** <10 heavy vehicle outward movements per day, surface material with low potential for dust release, unpaved road length <50m

Earthworks will result in the highest number of heavy vehicle movements, expected to be more than 50 heavy vehicle movements per day leaving the site (this would not occur for the entire duration), and all on-site haulage would include unpaved sections of road more than 100m long.

The dust emission magnitude is therefore:

- **Large** for earthworks.
- **Large** for trackout.

5.2.3 Step 2B – Sensitivity of Surrounding Area

The sensitivity of the surrounding area to dust impacts considers a number of factors, including:

- Specific receptor sensitivities;
- The number of receptors and their proximity to the works;
- Existing background dust concentrations; and,
- Site-specific factors that may reduce impacts, such as trees that may reduce wind-blown dust.

In accordance with the IAQM guideline, the following receptor sensitivity has been determined:

Industrial Receivers

- **Medium** sensitivity to dust soiling.
- **Medium** sensitivity to human health.

Residential Receivers

- **High** sensitivity to dust soiling.
- **High** sensitivity to human health.

Considering the above receptor sensitivities, **Table 5-1** and **Table 5-2** have been reproduced from the IAQM (only showing the "high" and "medium" receptor sensitivity applicable to this project) so that the sensitivity of the area can be determined.

It is critical to note that in the near future that the closest residential receivers will be developed in line with the Mamre Road Precinct requirements. It is therefore likely that the receptor sensitivity in the future will reduce from High to Medium for these nearby receivers.

For human health impacts, the mean background PM_{10} concentration of below 24 µg/m^3 has been used given the local ambient air quality measured (refer **Section 4.2**).

Table 5-1 Area Sensitivity Decision Matrix – Dust Soiling

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low

Table 5-2 Area Sensitivity Decision Matrix – Human Health

Receptor Sensitivity	Annual Mean PM_{10} concentration	No. of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	> 32 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low Risk	Low	Low	Low
	< 24 µg/m³	>100	Medium	Low Risk	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	> 32 µg/m³	> 10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m³	> 10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m³	> 10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	< 24 µg/m³	> 10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low

The sensitivity of the surrounding area (both residential and industrial receivers) has been determined to be:

- For earthworks:
  - **Low** sensitivity to dust soiling.
  - **Low** sensitivity to health impacts.
- For trackout:
  - **Low** sensitivity to dust soiling.
  - **Low** sensitivity to health impacts.

5.2.4 Step 2C – Define the risk of impacts

To define the risk of impacts, the dust emission magnitude ("large" for this site) is combined with the sensitivity of the area, as per **Table 5-3** and **Table 5-4** for earthworks and trackout, respectively.

Table 5-3 Risk of Dust Impacts – Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 5-4 Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

In accordance with **Table 5-3**, the proposed earthworks are considered to have a **low risk** of both dust soiling and human health impacts. In accordance with **Table 5-4**, the haulage activities are considered to have a **low risk** of both dust soiling and human health impacts.

It is important to note that the above risks assume that ***dust mitigation measures are not implemented***.

5.2.5 Step 3 – Site-specific Mitigation

The IAQM guidance document identifies a range of appropriate dust mitigation measures that should be implemented as a function of the risk of impacts. These measures are presented in **Section 6**.

5.2.6 Step 4 – Significance of Residual Impacts

In accordance with the IAQM guidance document, the final step in the assessment is to determine the significance of any residual impacts, following the implementation of mitigation measures. To this end, the guidance states:

> *For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be "not significant".*

Based on the proposed works, and the advice in the IAQM guidance document, it is considered unlikely that these works would result in unacceptable air quality impacts, subject to the implementation of the mitigation measures outlined in **Section 7**.

6 ASSESSMENT OF AIR QUALITY DURING OPERATION

6.1 Assessment Methodology

As mentioned previously in this assessment, in terms of air quality, the operation of this warehouse will generate additional traffic movements that will travel along Mamre Road.

The emissions would be of a similar nature to those already emitted by road traffic along the nearby road network, although at a much lower level and is therefore considered a low risk to the nearby receivers. Furthermore, the nearest residential receivers will, in the near future be developed into developments more compatible with the Mamre Road Precinct requirements. It is therefore likely that the receptor sensitivity in the future will reduce from High to Medium for these nearby receivers.

Similar to the assessment of construction dust (refer **Section 5**), an approach developed by the Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) has been referenced following an estimate of the contribution of the three main pollutants from the operation of Warehouse W5. The guideline is entitled *"Land-Use Planning & Development Control: Planning for Air Quality"* (EPUK & IAQM, 2017).

In particular Table 6.3 from the guideline has been referenced and reproduced as **Table 6-1**.

Table 6-1 Impacts Descriptors for Individual Receptors

Table 6.3: Impact descriptors for individual receptors.

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Explanation

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
2. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.
3. The Table is only designed to be used with annual mean concentrations.
4. Descriptors for individual receptors only; the overall significance is determined using professional judgement (see Chapter 7). For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

6.2 Operational Assumptions

All the additional traffic associated with Lot F – Warehouse W5 will travel along Mamre Road and eventually onto other arterial roads (such as Elizabeth Drive) and toll roads (such as M4). On this basis, we have conservatively assumed that the road traffic portion of the emissions within the Kemps Creek airshed is exclusively controlled by the traffic on Mamre Road. This is clearly not the case given the many other roads in this region however allows a conservative assessment.

The typical annual average daily traffic (AADT) of the above mentioned three roads is:

- Mamre Road 18,818 (including 14% heavy vehicles) - 2017 RMS counts
- Elizabeth Drive 25,296 (including 19% heavy vehicles) - 2017 RMS counts
- M4 59,284 (estimate of > 10% heavy vehicles) - 2016 RMS counts

The project traffic consultants has stated a total number of 1,528 trips per day would be generated by Warehouse W5.

The additional movements result in an approximate increase to the overall traffic movements by 8% in the area.

6.3 Estimate of Increase in Pollutants

Considering the main three pollutants, PM_{10}, $PM_{2.5}$ and NO_2, and assuming a worst case 8% increase in traffic, **Table 4-3** presented the estimated increase in pollutant concentration due to the operation of Warehouse W5.

Table 6-2 Increase in Concentration (ug/m^3) due to Warehouse W5

Pollutant	Existing Concentration (5 yr average)	Estimated[1] Concentration (Existing Traffic)	Estimated[2] Increase in Concentration (Warehouse W5 Operation Traffic)
PM_{10}	18.0	1.6	0.13
$PM_{2.5}$	8.2	0.8	0.06
NO_2	8.5	4.5	0.36

Note 1: Applied correction to *Existing Concentration (5 yr average)* as per Table 4-3 for year 2013.
Note 2: Applied 8% correction to *Estimated Concentration (Existing Traffic)* considering worst case increase in traffic.

It can be clearly seen from the above that the increase in each pollutant due to the operational traffic associated with Warehouse W5 is negligible.

Further considering the EPUK & IAQM, 2017 guideline, the impact and significance of Warehouse W5 operation for each pollutant is defined as:

- PM_{10} Negligible and Not Significant
- $PM_{2.5}$ Moderate (existing concentration is slightly above criteria) and Not Significant
- NO_2 Negligible and Not Significant

7 RECOMMENDED MITIGATION & MANAGEMENT

7.1 Dust Mitigation Measures

The assessment of potential dust impacts from the proposed works indicates the proposed project is considered to have a **low risk** of both dust soiling and human health impacts for earthworks and for haulage (trackout) activities if dust mitigation measures are not implemented. The potential risk for the other stages of construction will be of either low or negligible given that the worst case scenario (earthworks and associated haulage) has been considered.

To ensure best practice management, the following mitigation measures are recommended so that construction dust impacts are minimised and remain low risk.

- **Communications**
  - Develop and implement a stakeholder communications plan that includes community engagement before work commences on site, and:
    - Displays the name and contact details of the Responsible Person accountable for air quality and dust issues on the site boundary.
    - Displays the head or regional office contact information.
  - Develop and implement a Dust Management Plan (DMP) that considers, as a minimum, the measures identified herein.
- **Site management**
  - Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
  - Make the complaints log available to relevant authorities (Council, EPA, etc).
  - Record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in the logbook.
  - Hold regular liaison meetings with any other high-risk construction sites within 500 m of the site boundary to ensure plans are coordinated.
- **Monitoring**
  - Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust. Record inspection results and make available to relevant authorities. This should include regular dust soiling checks of surfaces such as street furniture, cars and window. Specific real-time dust monitoring is not necessary for this project.
- **Preparing & Maintaining the Site**
  - Plan site layout so that machining and dust generating activities are located away from receptors, as far as possible.
  - Avoid site runoff of water or mud.
  - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If being re-used, keep materials covered.

  - Cover, seed or fence stockpiles to prevent wind erosion.

- **Construction vehicles and sustainable travel**
  - Ensure all vehicles switch off engines when stationary – no idling vehicles.
  - Impose and signpost a maximum-speed-limit of 25km/h on surfaced and 15km/h on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided).

- **Measures for general construction activities**
  - Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
  - Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

- **Measures specific to haulage**
  - Use water-assisted dust sweeper(s) on the access and local roads, as necessary.
  - Avoid dry sweeping of large areas.
  - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
  - Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
  - Record all inspections of haul routes and any subsequent action in a site logbook.
  - Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
  - Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
  - Access gates to be located at least 10m from receptors where possible.

7.2 Operational Mitigation Measures

Although no specific mitigation measures have been triggered, it would be sensible to:

  - Limit unnecessary idling of truck engines on-site.
  - Ensure truck maintenance is up to date.

8 CONCLUSION

Wilkinson Murray Pty Limited has prepared an air quality impact assessment to form part of a State Significant Development Application (SSDA) for the warehouse development at 200 Aldington Road, Kemps Creek.

The application seeks approval for the Concept Plan, as well as the construction and operation of Stage 1 (Warehouse W5).

The assessment concludes:

- The construction phases can be adequately managed so that the short-term and temporary dust related impacts will remain to be low risk.
- Operational phase will result in similar emissions from the immediate road network, although estimated to result in a negligible increase. In accordance with the EPUK & IAQM guideline, the impact and significance has been determined to be negligible to moderate AND insignificant.